



**PATENT APPLICATION**  
**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of

Docket No: Q63901

Shuji HITOMI

Appln. No.: 09/822,311

Group Art Unit: 1746

Confirmation No.: 7349

Examiner: Gentle E. Winter

Filed: April 02, 2001

For: ELECTRODE FOR FUEL CELL AND PROCESS FOR THE PREPARATION  
THEREOF

**REQUEST FOR RECISION OF ISSUED NOTICE OF ABANDONMENT OR, IN THE  
ALTERNATIVE, PETITION TO WITHDRAW HOLDING OF ABANDONMENT**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Applicant respectfully submits that the Notice of Abandonment dated February 25, 2004 was issued in error and requests that this Notice be rescinded in view of the following.

On July 23, 2003, an Office Action was issued by the U.S. Patent and Trademark Office. In response thereto, on October 23, 2003, Applicant timely filed an Amendment under 37 C.F.R. §1.111. Copies of the Amendment filed on October 23, 2003 and the PTO Mail Room date stamped receipt acknowledging receipt of the Amendment by the U.S. Patent and Trademark Office on October 23, 2003 are attached.

In view of Applicant's timely filing of the Amendment on October 23, 2003, it is respectfully submitted that Notice of Abandonment of February 25, 2004 issued in the above-identified application was in error, and it is respectfully requested that the Notice of Abandonment be rescinded.

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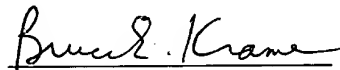
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Should it be necessary for this request to be treated as a Petition, it is requested that this request be so treated. Moreover, while no petition fees are considered necessary in view of the above, the PTO is authorized to charge any necessary fee to Deposit Account No. 19-4880. A duplicate copy of this paper is enclosed.

Favorable action is respectfully requested.

Respectfully submitted,



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Registration No. 33,725

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WASHINGTON OFFICE

**23373**

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Date: March 24, 2004



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PAPER(S) FILED ENTITLED:

1. Amendment Under 37 C.F.R. §1.111 (9 pages)

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DOCKET NO.: Q63901  
ATTORNEY/SEC: BEK/lin  
Date Filed: October 23, 2003

WASHINGTON OFFICE

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**PATENT APPLICATION**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of

Docket No: Q63901

Shuji HITOMI

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For: ELECTRODE FOR FUEL CELL AND PROCESS FOR THE PREPARATION  
THEREOF

**AMENDMENT UNDER 37 C.F.R. § 1.111**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the Office Action dated July 23, 2003, please amend the above-identified application as follows on the accompanying pages.

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**AMENDMENTS TO THE CLAIMS**

**This listing of claims will replace all prior versions and listings of claims in the application:**

**LISTING OF CLAIMS:**

1. (currently amended): An electrode for fuel cell, which comprises:
  - (a) a catalyst layer comprising catalyst particle; and
  - (b) a gas diffusion layer comprising both a porous polymer having pores in its material containing and an electro-conductive filler.
2. (currently amended): The electrode for fuel cell according to Claim 1, wherein said [[a]] gas diffusion layer further comprises an electro-conductive backbone in which said porous polymer is applied.
3. (original): The electrode for fuel cell according to Claim 2, wherein said electro-conductive backbone comprises an aggregate of carbon fibers.
4. (original): The electrode for fuel cell according to Claim 2, wherein said electro-conductive filler comprises a chopped carbon fiber.
5. (original): The electrode for fuel cell according to Claim 2, wherein said electro-conductive filler comprises a carbon particle.
6. (original): The electrode for fuel cell according to Claim 2, wherein said porous polymer comprises a fluoropolymer.
7. (currently amended): The electrode for fuel cell according to Claim [[2]]6, wherein said fluoropolymer comprises a polyvinylidene fluoride (PVdF).

8. (original): The electrode for fuel cell according to any one of Claims 1 to 7, wherein said gas diffusion layer has a porosity of from 45% to 95%.

9. (withdrawn): A process for the preparation of an electrode for fuel cell, which comprises:

(a) a step of dispersing an electro-conductive filler in a solution (1) comprising a polymer and its solvent to obtain a dispersion;

(b) a step of subjecting said dispersion to phase separation of the polymer and the solvent to form a gas diffusion layer comprising porous polymer containing the filler; and

(c) a step of applying a paste comprising a catalyst particle to said gas diffusion layer.

10. (withdrawn): A process for the preparation of an electrode for fuel cell comprising:

(a) a step of forming a catalyst layer containing a catalyst particle;

(b) a step of dispersing an electro-conductive filler in a solution (1) comprising a polymer and its solvent to obtain a dispersion

(c) a step of applying the dispersion on said catalyst layer; and

(d) a step of subjecting said dispersion applied to the catalyst layer to phase separation of the polymer and solvent to form a gas diffusion layer comprising porous polymer containing the filler.

11. (withdrawn): A process for the preparation of an electrode for fuel cell comprising:

(a) a step of forming a catalyst layer containing a catalyst particle;

(b) a step of laminating an electro-conductive backbone on said catalyst layer;

(c) a step of dispersing an electro-conductive filler in a solution (1) comprising a polymer and its solvent to obtain a dispersion;

(d) a step of applying the dispersion in said electro-conductive backbone; and

(e) a step of subjecting said dispersion incorporated in said electro-conductive backbone to phase separation of the polymer and solvent to cause said electro-conductive backbone containing a porous polymer, wherein the porous polymer contains the electro-conductive filler.

12. (withdrawn): A process for the preparation of an electrode for fuel cell comprising:

(a) a step of dispersing an electro-conductive filler in a solution (1) comprising a polymer and its solvent to obtain a dispersion;

(b) a step of applying the dispersion in an electro-conductive backbone;

(c) a step of subjecting the dispersion incorporated in said electro-conductive backbone to phase separation of polymer and solvent to cause the electro-conductive backbone containing a porous polymer, wherein the porous polymer contains said electro-conductive filler; and

(d) a step of laminating said electro-conductive backbone containing the said porous polymer on a catalyst layer containing a catalyst particle.

13. (withdrawn): The process for the preparation of an electrode for fuel cell according to any one of Claims 9 to 12, wherein said phase separation is accomplished by extracting said solvent from said dispersion by a solution (2) which is insoluble for the polymer and is compatible with the solvent.

14. (original): A fuel cell comprising an electrode according to any one of Claims 1 to 7.

15. (currently amended): ~~The~~A fuel cell comprising an electrode according to Claim 8.

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16. (withdrawn): A fuel cell comprising an electrode prepared by the preparation process according to any one of Claims 9 to 12.

17. (withdrawn): A fuel cell comprising an electrode prepared by the preparation process according to Claim 13.



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**REMARKS**

Claims 1-17 are all the claims pending in the application. Claim 1 has been amended to distinguish the invention recited therein more clearly. The remaining changes in the claims are editorial in nature or correct inadvertent errors.

Entry of the above amendment is respectfully requested.

**Preliminary Matters**

(1) On the Office Action Summary, the Examiner has neither acknowledged Applicant's claim for priority nor indicated that the certified copies of the priority documents have been received. Since priority was claimed in the application transmittal letter filed April 2, 2001, and since certified copies of the priority documents were filed October 1, 2001, Applicant respectfully requests that in the next communication from the PTO the Examiner acknowledge Applicant's claim for priority and indicate that the certified copies of the priority documents have been received.

(2) On the PTO/SB/08 A & B (modified) form attached to the Office Action, Applicant notes that the Examiner has lined out the citation to USAN 09/497,515. Since a copy of USAN 09/497,515 was filed with the PTO/SB/08 A & B (modified) form, Applicant respectfully requests that the Examiner consider USAN 09/497,515, and indicate in the next communication from the PTO that it has been considered.

**Anticipation Rejection over Paganin**

On page 2 of the Office Action, claims 1-3, 5, 6, and 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Paganin et al, Journal of Applied Electrochemistry (1996). (Paganin).

**The Examiner's Position**

The Examiner's position with respect to claim 1 is that the claim is directed to an electrode for fuel including a catalyst layer and a gas diffusion layer, and that the gas diffusion layer includes a porous polymer containing electro-conductive filler. The Examiner indicates that the same is disclosed in the first column of page 297, and that platinum is construed as the conductor.

**Applicant's Response**

In response, Applicant submits initially that the Examiner's position is derived from a misunderstanding of the meaning on the word "porous" in the claim 1. That is to say, the Examiner considers the word "porous" to refer to the existence of a pore as a void space in the gas diffusion layer. Such a pore exists in the any gas diffusion layer, including the present case.

However, the "porous polymer" recitation should be read as "porous polymer having pores in its material". Namely, numerous pores are formed in the polymer material in this invention. This is supported by the fact that the electrode of the present invention is prepared by using a phase separation process as described from line 7 of page 20 to line 2 of page 21 of the

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present specification. The numerous pores formed according to the process, e.g., by using a solvent extraction method, will be produced in the polymer material itself with little shrinkage of the polymer even after the drying process, because pore formation is conducted in the polymer solution by replacing the solvent dissolved polymer with water, and only water in the pores of the polymer is evaporated by the drying process.

On the contrary, in the case of Paganin's process for making the gas diffusion layer, the mixture of carbon powder and PTFE suspension comprising both PTFE powder and water in the carbon cloth is only dried. The pores will be produced as a void space between the PTFE and the carbon in the structure of solid mixtures by evaporating the water during the drying process.

Thus, Applicant submits that the present invention is not anticipated by (or obvious over) Paganin. Accordingly, withdrawal of this rejection is respectfully requested.

#### **Anticipation Rejection over Reddy**

On page 3 of the Office Action, in paragraph 7, claims 1-8 and 15 are rejected under 35 U.S.C. 102(b) as being anticipated by United States Patent No. 5,085,743 Reddy et al (Reddy).

#### **The Examiner's Position**

The Examiner's position as to claims 1-3 and 5 is that the reference discloses an electrode comprising a catalyst layer (see e.g. column 3, line 44 *et seq.*) comprising particle (preferably gold) and a gas diffusion layer comprising a porous polymer containing an electro-conductive filler, such as carbon particles (preferably carbon fibers).

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### Applicant's Response

In response, Applicant submits that in the case of Reddy, the electrode has a non-porous hydrophobic polymer layer, but not a porous hydrophobic polymer layer as in the present invention (see column 8, lines 57-61).

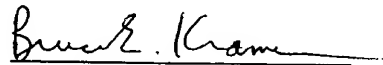
Therefore, Applicant submits that the present invention is not anticipated by (or obvious over) Reddy. Accordingly, withdrawal of this rejection is respectfully requested.

### Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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